

siders that in all cases, germination of seeds may be accelerated by covering them with such blue glass as is used in making many finger glasses; and that the striking of cuttings would be quickened by similar glass shades. When there is a tendency in plants to form too much stalk or leaves, and it is desired to produce more wood, this is done by admitting as much light as possible with the smallest possible quantity of actinic power. To effect this he proposes to interpose glasses of a yellow colour, "which obstruct the passage of the chemical rays, but intercept but little light." And then, when, the vegetable functions being too active, and interfering with the reproductive powers of the plant, leaves are produced in the centre of the flower, he says all his experiments prove that the calorific radiations are the most active during the period when the plant produces flower, fruit, or seed, and "we may secure at will the absence of the luminous rays in considerable quantity, and a diminished quantity of the chemical or actinic radiations, without interfering with the heat-giving principle, by the use of glasses coloured red by the oxide of gold."

"Pray do not let it be said that you are afraid of Mr. Fergusson's pamphlet on the British Museum," kindly exhorts one correspondent, with almost fraternal anxiety for our reputation; while a second says, with less consideration but much the same real animus, "We (that is, he and the world) infer from your silence that you are afraid of repeating Mr. Fergusson's opinions of the British Museum." There are some people on this earth so curiously fashioned and attuned that they are never happy unless they are snarling and biting, and who think that all who do not pursue the same course either want honesty or courage. Strangely enough, minds of this order are usually less patient under criticism themselves than others. A well-known architect once said; "I like THE BUILDER very well,—cannot get over Saturday without seeing it; but it is too good-natured; it does not abuse living architects half enough." A remark, by a correspondent, on one of his own buildings, accidentally appeared in our pages a short time afterwards, and he never forgave the plain speaking he had desired. Enough, however, of this: we are brave enough to look with consideration and kind feeling on the efforts of contemporaries, and are not afraid of doing anything but what is wrong.

Mr. Fergusson's pamphlet—"Observations on the British Museum, National Gallery, and National Record Office, with Suggestions for their Improvement,"\* is, like other works of the same author, an able expression of the thoughts of an intelligent mind. It has been called a "stunner" and a "slasher," and such like, and so it is. We would, however, with friendly admiration, caution Mr. Fergusson against being petted into the practice of constant fault-finding, and the acquirement of a dogmatic tone which results from such a course, and is contrary to his better feelings.

The British Museum is said to be "as bad and as extravagant a building as could well be designed," (the assertion afterwards made that none of the blame rests on Sir Robert Smirke goes for nothing); of Mr. Barry's new Houses of Parliament, the public are said to be "already tired before they are finished;" and Mr. Bloer's new buildings at Buckingham Palace are termed "hideously ugly." Now, this really does not seem to us the right way

of dealing with such men; and this we say, notwithstanding our want of admiration for the Museum, our repeated protest against the reserve which shut out the public from any knowledge of what the building was to be until it was up, and the fact that, before the additions were made to Buckingham Palace, we showed our readers that they would be very unsatisfactory. "Hideously ugly," however, is not the term, and it is against this "stunning" and "slashing" to which Mr. Fergusson will be further led, if what has been elsewhere said of his pamphlet have any influence, that we with kindest intention dissent.

#### THE POTTERY AND IRON FLOORS OF PARIS.

AMONGST the improvements made in the art of building since the last "Exposition of Industry" in this town, one of the most important appears to be the application of wrought iron for flooring purposes. As this mode of employing a material we possess in such abundance, and at such very low prices, is but little known in England, some notes upon the subject may be useful. It is to be observed, firstly, that the practice of building in Paris being rarely to make floors of more than from 20 feet to 30 feet bearing, the notes are to be considered as applicable within those limits, unless otherwise specified.

There are three modes of employing wrought-iron: firstly, with wrought-iron frames, filled in with hollow pots bedded with plaster. Secondly, the wrought-iron frames are filled in with light rubble, also set with plaster. Thirdly, the main joists are made of wrought-iron, wood trimmers are introduced, and the whole framework is then bound together with tie rods.

Firstly. The use of pottery for flooring purposes is far from being of modern invention; instances being met with in the ancient Roman edifices. The round church of Ravenna has walls and a dome of pottery. But the first attempts made to introduce the use of these hollow materials into general practice appears to have been shortly before the revolution of 1789: about that time the Academy of Sciences of France made an elaborate report upon, and even began some experiments upon the force of resistance of, a system of flooring executed entirely in pots and plaster. Iron was in those days too dear to allow of its use in ordinary cases; these floors were therefore cambered. During the empire, and in the beginning of the restoration, the vaults of the spirit cellars of the Entrepôt des Vins were executed with skew backs of solid brickwork, and the arches were filled in with pottery; they were about 19 feet span. In the corridors of the Chamber of Deputies, arches from 26 feet to 27 feet span, panelled, and springing from pendentives, were executed in the same manner, as were also some of the circular-headed niches of the Madeleine.

In the palaces of Versailles and the Tuilleries pottery floors have been executed, the dimensions of which are about 66 feet in length by 33 feet in width. But for the usual dimensions of from 20 feet to 30 feet the usual course adopted is as follows:—

Framed wrought-iron girders (consisting of a chord bar  $1\frac{1}{2} \times \frac{3}{4}$ , with a bar of the same scantling curved so as to rise about 8 inches in the centre, maintained in their respective positions by clipping pieces, keys, and wedges) are inserted at distances of about 13 feet from centre to centre. An intermediate bar 2 inches by  $\frac{3}{4}$  inch is placed between the girders, and this framework is kept in its vertical position by means of cross ties, which pass over and notch down upon the different beams; the cross ties are of  $1\frac{1}{2} \times \frac{3}{4}$ . Small square bars are laid upon the top of the cross ties (of  $\frac{3}{4}$  inch square iron) and split rods  $\frac{3}{4}$  inch square are laid upon these. In fact, a sort of net work is formed, the intervals of which are about 3 feet square, which is subsequently filled with pottery. This is done upon a centre large enough to take one bay at a time.

The pots used for flooring purposes are of two dimensions— $7\frac{1}{2}$  inches high by  $4\frac{1}{4}$  inches diameter, and  $8\frac{1}{2}$  inches high by  $4\frac{1}{4}$  inches diameter. The upper end is beaten into a sort

of octagonal form, but the main body of the pots is cylindrical.

A floor executed with pots  $7\frac{1}{2}$  inches high carried a weight of about  $3\frac{1}{2}$  cwt. to the foot superficial before breaking. Another floor, executed with pots  $8\frac{1}{2}$  inches high, carried  $4\frac{1}{2}$  cwt. to the foot superficial.

The French architects have also employed these hollow materials in positions which have allowed them to economise much room, namely, for partitions and party-walls. The police authorities some time since called upon the proprietors of the theatre, then called, of the Palais Royal, to separate it from the adjoining tenements by a wall impervious to fire. This end was effected by building a wall, 36 feet long by 66 feet high, with hollow pots  $8\frac{1}{2}$  inches long, bedded in plaster and rendered on both sides with the same material. Our Building Act would hardly admit of the execution of a party-wall of these dimensions, for with the two coats of plaster it is barely 11 inches thick; yet experiments have shown, that for the purpose of intercepting the progress of fire it is established in the most favourable conditions. So satisfied are the French architects with this mode of employing the hollow material that in many of the most important modern buildings they have repeated its application; as, for instance, in the Palace of the Quai d'Orsay.

Secondly.—The wrought-iron floors are sometimes executed with ribs, or bars,  $6 \times \frac{3}{4}$ , built into the walls every 3 feet 4 inches apart, when the spans are about 18 feet. Upon these, cross ties of  $\frac{3}{4}$  square iron are laid, and split rods 3-8ths thick complete the net-work; the cross ties being spaced about 3 feet 4 inches from centre to centre, the split rods about 8 inches apart. The whole of this framing is then filled in solid with light plaster rubble, floated with plaster; care being taken not to carry the works close up against the walls, or the expansion of the plaster would either force them out, or cause the floor to sink.

Floors executed upon this system were first adopted in the year 1845, about the epoch of the great strike of the carpenters of Paris. They are now becoming of general use; but although they resist the transmission of fire, they are exposed to the very serious objections of being very heavy, of loading the walls to an unnecessary extent, and of being very expensive. In England, moreover, the absence or want of good plaster opposes an insurmountable objection to the adoption of this system. Cement might be substituted, but that is still, notwithstanding the great diminution in price, too expensive to admit of its use in such great quantities.

Thirdly.—A M. Rosier, master carpenter, of Paris, has sent to the Exposition a specimen of a floor, which appears to obviate the objections to the expense of the first system, and the unnecessary weight of the second. Every 3 feet 4 inches apart he introduces a wrought-iron bar, of the shape of an H laid flat,  $5\frac{1}{2}$  inches deep; the centre web  $\frac{3}{4}$  inch thick, top and bottom flanges  $1\frac{1}{2}$  inches wide by  $\frac{1}{2}$  inch thick. These bars rest upon the walls, and each alternate bar is tied down with vertical rods. Between these bars, at distances of  $19\frac{1}{2}$  inches from centre to centre, trimmers of wood  $5\frac{1}{2} \times 1\frac{1}{2}$  are introduced flush with the under surfaces of the wrought-iron bars; and at the side of the trimmers a straining bolt  $\frac{1}{2}$ -inch in diameter, is placed to tie the whole system together. The laths and floor boards are fastened to the trimmers, which, at the same time, afford the means of introducing sound boarding and pugging. The wrought-iron bars weigh about 29 lbs. to 31 lbs. per 3 feet 4 inches run, or between 13 and 14 kilogrammes to the mètre.

These floors are exceedingly stiff, and when covered with tiles, as they commonly are here, they are, for all practical purposes, fire-proof, although certainly not so efficient in this respect as the floors constructed upon the two previously described systems. All the different modes have the great advantage of requiring but little comparative depth. For instance, a floor constructed upon either of the two last-named, need not be more than 8 inches thick, flooring and ceiling included, for a span of 20 feet; for a span of 30 feet, 10 inches would be sufficient. A pottery floor of 33 feet span need not be more than 13 inches deep, with floor and ceiling.

Paris.

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